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Advanced light sculpting for contemporary biophotonics

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Our proprietary Generalized Phase Contrast (GPC) method is a light efficient approach for generating speckle-free contiguous optical distributions using binary-only or analog spatial phase modulation. It has been used in applications such as optical trapping and manipulation, active microscopy, structured illumination, optical security, parallel laser marking and recently in contemporary biophotonics applications such as for real-time parallel two-photon optogenetics and neurophotonics. Our most recent GPC light sculpting developments geared towards these applications will be presented. This includes both a static and a dynamic GPC Light Shaper implementation based on our latest theoretical derivations to demonstrate the benefits for typical applications where lasers have to be actively shaped into particular light patterns. We then show the potential of GPC for biomedical and multispectral applications where we experimentally demonstrate the active light shaping of a supercontinuum laser over most of the visible wavelength range.

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